

· 临床论著 ·

单踝与全膝关节置换术治疗膝关节骨性关节炎的效果

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摘要: **目的** 比较膝关节单踝置换术(UKA)与全膝关节置换术(TKA)对膝关节骨性关节炎(KOA)的治疗效果,为临床选择最佳手术方案提供参考。**方法** 选取2020年2月至2021年2月石家庄市人民医院进行膝关节置换术治疗的104例KOA患者,根据KOA疾病分级及病变部位将患者分为单间室病变组36例(采取髌股关节置换术或UKA),双间室病变组(行组配式双间室膝关节置换术)35例,三间室病变组(采用TKA)33例。随访术后18个月患者关节功能恢复情况,比较术前、术后各组患者膝关节的活动度(ROM)、美国膝关节学会评分系统(KSS)临床评分、KSS功能评分、日本骨科学会(JOA)评分以及血清白细胞介素(IL)-6、IL-7水平。**结果** 术后,3组患者ROM评分、KSS临床评分、KSS功能评分及膝关节功能JOA评分较术前升高,且单间室病变组和双间室病变组高于三间室病变组($P<0.05$)。术后,单间室病变组、双间室病变组和三间室病变组优良率分别为72.22%、74.29%和66.67%,3组临床疗效差异无统计学意义($\chi^2=0.510$, $P=0.774$)。术后,3组患者血清IL-6、IL-7水平较术前显著降低,且单间室病变组和双间室病变组低于三间室病变组($P<0.05$)。**结论** UKA与TKA在KOA治疗中可获得较好疗效,根据膝关节疾病分级及病变位置选择合适手术方式可更好的促进KOA患者膝关节功能恢复,获得更佳治疗效果。

关键词: 膝关节单踝置换术; 全膝关节置换术; 膝关节骨性关节炎; 膝关节功能; 髌股关节置换术

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Effects of unicondylar and total knee arthroplasty on knee osteoarthritis

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Abstract: **Objective** To compare the therapeutic effects of unicondylar knee arthroplasty (UKA) and total knee arthroplasty (TKA) on knee osteoarthritis (KOA) to provide references for the clinical selection of the best surgical approach. **Methods** A total of 104 KOA patients who underwent knee arthroplasty at Shijiazhuang People's Hospital from February 2020 to February 2021 were selected. Patients were divided into three groups based on the classification and lesion location of KOA: unicompartement lesion group (36 cases, undergoing patellofemoral joint replacement or UKA), two compartments lesion group (35 cases, undergoing simultaneous two compartments knee arthroplasty), and three compartments lesion group (33 cases, undergoing TKA). The postoperative recovery of joint function was followed up for 18 months. The range of motion (ROM), American Knee Society Score clinical score, KSS functional score, Japanese Orthopedic Association Assessment (JOA) score of knee joint, and serum interleukin (IL)-6 and IL-7 levels of patients were compared among three groups before and after surgery. **Results** After surgery, the ROM score, KSS clinical score, and KSS functional score, and JOA score of knee joint function in the three groups increased compared to preoperative values, with those in unicompartement lesion group and two compartments lesion group being higher than in three compartments lesion group ($P<0.05$). After surgery, the excellent and good rate in the unicompartement lesion group, the two compartments lesion group and the three compartments lesion group were 72.22%, 74.29% and 66.67%, respectively. There was no statistically significant difference in clinical efficacy among the three groups ($\chi^2=0.510$, $P=0.774$). After surgery, the serum levels of IL-6 and IL-7 in the three groups significantly decreased compared to preoperative levels, with those in unicompartement lesion group and two compartments lesion group being lower than three

compartments lesion group ($P < 0.05$). **Conclusion** Both UKA and TKA can achieve good therapeutic effects in the treatment of KOA. Choosing the appropriate surgical approach based on the classification and lesion location of knee joint diseases can better promote the recovery of knee joint function and achieve better treatment results in KOA patients.

Keywords: Unicompartmental knee arthroplasty; Total knee arthroplasty; Knee osteoarthritis; Knee joint function; Patellofemoral joint replacement

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膝关节骨性关节炎(knee osteoarthritis, KOA)是老年常见疾病之一,可引起一个或三个节间室病变,主要表现为关节疼痛及活动障碍,进而影响患者行走、活动,严重影响患者生活质量^[1-2]。目前临床手术治疗主要为膝关节单髁置换术(unicompartmental knee arthroplasty, UKA)和全膝关节置换术(total knee arthroplasty, TKA),技术成熟、效果满意^[3-4]。然而对于膝关节病变仅局限在髌股关节或者内侧间室患者,可行髌股关节置换术(patellofemoral joint replacement, PFJ)或UKA得到阶梯化治疗,但对于双间室病变患者,单间室置换手术并不能完全解除未置换间室的骨关节炎症状,通常需采取TKA进行治疗,虽然TKA疗效稳定和技术成熟,但TKA创伤较大,膝关节无法恢复较高的功能水平,同时损失骨量较多,易导致翻修手术复杂化^[5-6]。随着骨关节外科手术膝关节部分置换技术的发展与成熟,可保留前后交叉韧带、创伤较小的组配式双间室膝关节置换术(BKA)得以实现,即PFJ联合UKA,成为膝关节双间室骨关节炎治疗最佳方法^[7-8]。因此,针对不同KOA疾病情况和病变位置选择合适的治疗方案对患者具有积极意义。基于此,本研究通过单间室病变患者采取PFJ或UKA,对于双间室病变患者(内侧和髌股关节)采取BKA,对于三间室病变患者采用TKA。随访术后18个月后患者膝关节活动度(range of motion, ROM)评分、美国膝关节学会评分系统(American Knee Society Score, KSS)临床评分和功能评分、临床疗效及炎症因子水平变化情况,进而为不同膝节疾病分级及病变部位患者选择最合适的治疗方式提供参考。

1 资料与方法

1.1 一般资料 选取2020年2月至2021年2月石家庄市人民医院进行膝关节置换术治疗的104例KOA患者,其中男性63例、女性41例;年龄48~79(56.48±4.32)岁。根据KOA疾病分级及病变部位将患者分为单间室病变组(采取PFJ或UKA)31例,双间室病变组(行BKA)30例,三间室病变组(采用TKA)33例。

纳入标准:膝关节内侧间室疼痛或压痛;X线平片显示内侧间室存在骨性关节炎表现;屈曲畸形 15° 以下,关节活动度 90° 及以上;膝关节无内、外翻畸形或内翻 15° 以内可经手法矫正;患者及家属知情且签署知情同意书。排除标准:合并感染性疾病;炎症性关节炎,如类风湿、结核性等;外侧踝关节炎;运动量较大者(如运动员);拒绝或不配合研究者。本次研究获医院伦理委员会批准(伦理批号:2020-KYLN-023)。

1.2 方法

1.2.1 单间室病变组 采取PFJ或UKA。麻醉后,患者于仰卧位下手术,先进行留置导尿管、术区消毒、无菌单,患肢上屈血带及止血带,贴保护贴膜等常规操作。于患膝髌骨中线内侧纵行切开一条约10 cm切口,逐步切开各层组织,然后在髌旁内侧切开关节囊,开始清除股骨髁和胫骨周围多余赘骨,如有必要还需进行适当松解软组织,并检查髌骨软骨面、外侧间室软骨关节面及交叉韧带是否存在损伤或异常情况,明确手术指征后,于胫骨髓外安装定位杆定位截骨,并插入定位杆,明确定位并截骨。同时安装胫骨平台假体试模,并屈伸膝关节感受其稳定性及周围软组织张力情况,确保屈伸时不会阻碍髌骨运动。然后冲洗骨面,调和骨水泥,安装胫骨、股骨假体,并清除掉多余的骨水泥,加压使骨水泥硬化。然后用咬钳修整髌骨周边骨赘,放置高聚乙烯衬垫,并测试屈伸膝关节可进行正常活动,髌骨活动范围正常无影响,则可留置引流管,然后缝合切口。

1.2.2 双间室病变单组 行BKA。(1)对于双间室病变患者采用组配式联合假体置换术,即同一患者使用两组假体(髌股假体联合单髁假体)联合置换,切开关节囊后适当松弛内侧间隙张力,保留1~2 mm间隙,术中胫骨截骨采用髓外定位方法,遵循等量截骨的原则,股骨截骨采用间隙定位方法,经手法矫正关节内翻畸形后确定股骨远端截骨量,胫骨假体旋转对线应与膝关节活动矢状面平行,可用标记号笔标记膝关节活动曲线,然后调整股骨及胫骨假体大小,然后安装并缝合切口。(2)对于髌股关节单间室病变患者行PFJ,术中PFJ的滑车假体应选择非嵌入式(onlay)假体,股骨截

骨时,保持旋转角度与股骨通髁线平行或与 Whiteside 线垂直,尽量保证良好的髌股关节旋转对线。

1.2.3 三间室病变组 采取 TKA。髌骨内侧纵行切开一条约 15 cm 切口,逐层切口各层组织并钝性分离股四头肌,检查髌骨软骨面、外侧间室软骨关节面及交叉韧带是否存在损伤或异常,明确手术指征后,外翻髌骨并屈膝,切除半月板及部分脂肪垫及前交叉韧带,然后去除骨赘,分别在股骨髓内和胫骨髓外插入定位杆进行定位截骨,此时注意不要伤及内外侧副韧带。安装胫骨、股骨试模,获得合适的假体和聚乙烯垫片,然后冲洗骨面,安装胫骨、股骨假体,髌骨不做置换,用咬钳修整髌骨周边骨赘,以电刀烧灼处理处,留置引流管,然后缝合切口。

1.3 观察指标

1.3.1 手术前后两组患者关节活动度 (ROM) 评分、KSS 临床评分、KSS 功能评分比较 分别于术前和术后进行 ROM 评分^[9],髌关节前屈 (10 分),髌关节后伸 (10 分),髌关节内收外展 (10 分),膝关节屈曲、伸展 (10 分),髌关节内旋、外旋 (10 分),踝关节背屈、跖屈 (10 分),踝关节内翻、外翻 (10 分),分值高表示关节功能好。采用 KSS 临床评分和功能评分^[10]对患者膝关节功能进行评分,KSS 临床评分内容包括:主诉疼痛 50 分,稳定性 25 分,活动范围 25 分,缺陷扣分;KSS 功能评分行走情况 50 分,上下楼梯 50 分,功能缺陷扣分,分值高表示关节功能好。

1.3.2 术前和术后膝关节功能 JOA 评分比较 分别于术前和术后采用日本骨科学会膝关节功能 JOA 评分^[11]对膝关节功能进行评估,内容包括步行疼痛 (0~30 分)、肿胀疼痛 (0~10 分)、上下楼梯疼痛 (0~25 分)、关节活动度 (0~35 分),满分 100 分,分值高表示关节功能好。

1.3.3 术后临床疗效比较 采用 KSS 评分中的疼痛评分^[12]对术后临床疗效进行判定,评分为 50 分表示无痛的记为“优”,评分为 30~45 表示轻度或偶尔疼痛的记为“良”,评分为 10~20 分表示偶发或持续中

度疼痛的记为“中”,评分为 0 分表示疼痛严重的记为“差”,并计算优良率=(优+良)/总例数×100%。

1.3.4 术前、术后两组患者血清炎症因子水平比较 分别于术前和术后 18 个月取患者空腹静脉血约 3 mL,使用北京索莱宝生物公司试剂盒,采用酶联免疫吸附法检测其血清白细胞介素 (IL)-6、IL-7 水平,相关操作严格按试剂盒说明书进行。

1.4 统计学方法 采用 SPSS 19.0 软件处理数据。计数资料用例 (%) 表示,采用 χ^2 检验;计量资料用 $\bar{x}\pm s$ 表示,多组比较采用 F 检验和两两比较的 LSD- t 检验。 $P<0.05$ 为差异有统计学意义。

2 结果

2.1 术前和术后 3 组患者 ROM 评分、KSS 临床评分、KSS 功能评分比较 术前,两组患者 ROM 评分、KSS 临床评分、KSS 功能评分差异无统计学意义 ($P>0.05$);术后,3 组患者 ROM 评分、KSS 临床评分、KSS 功能评分较术前升高,且单间室病变组和双间室病变单组 ROM 评分、KSS 临床评分、KSS 功能评分分别高于三间室病变组,差异有统计学意义 ($P<0.05$)。见表 1。

2.2 术前和术后 3 组患者膝关节功能 JOA 评分比较 术前,3 组患者膝关节功能 JOA 评分差异无统计学意义 ($P>0.05$);术后,3 组患者膝关节功能 JOA 评分较术前显著改善,且单间室病变组和双间室病变单组膝关节功能 JOA 评分分别高于三间室病变组,差异有统计学意义 ($P<0.05$)。见表 2。

2.3 术后临床疗效比较 术后,3 组临床疗效优良率差异无统计学意义 ($P>0.05$)。见表 3。

2.4 术前、术后 3 组患者血清炎症因子水平比较 术前,3 组患者血清 IL-6、IL-7 水平差异无统计学意义 ($P>0.05$);术后,3 组患者血清 IL-6、IL-7 水平较术前降低,且单间室病变组和双间室病变单组血清 IL-6、IL-7 水平分别低于三间室病变组,差异有统计学意义 ($P<0.05$)。见表 4。

表 1 术前和术后 3 组患者 ROM 评分、KSS 临床评分、KSS 功能评分比较 (分, $\bar{x}\pm s$)

Tab. 1 Comparison of ROM score, KSS clinical score and KSS functional score among three groups before and after surgery (point, $\bar{x}\pm s$)

组别	例数	ROM 评分		KSS 临床评分		KSS 功能评分	
		术前	术后	术前	术后	术前	术后
单间室病变组	36	106.34±12.57	128.52±14.31 ^{ab}	46.72±6.35	85.62±9.37 ^{ab}	46.55±6.32	85.49±9.26 ^{ab}
双间室病变单组	35	106.41±12.43	121.46±13.58 ^{ab}	46.79±6.28	80.47±8.32 ^{ab}	46.39±6.24	81.22±8.42 ^{ab}
三间室病变组	33	106.48±12.35	114.37±13.42 ^a	46.83±6.24	71.45±7.63 ^a	45.61±6.38	73.58±7.64 ^a
F 值		0.001	9.077	0.003	24.376	0.215	17.270
P 值		0.999	<0.001	0.997	<0.001	0.807	<0.001

注:与本组术前比较,^a $P<0.05$;与三间室病变组比较,^b $P<0.05$ 。

表2 术前和术后3组患者膝关节功能JOA评分比较 (分, $\bar{x}\pm s$)

Tab. 2 Comparison of JOA scores of knee joint function among the three groups before and after surgery (分, $\bar{x}\pm s$)

组别	例数	步行疼痛		肿胀疼痛		上下楼梯疼痛		关节活动度		总分	
		术前	术后	术前	术后	术前	术后	术前	术后	术前	术后
单间室病变组	36	9.12±2.23	25.34±3.62 ^{ab}	4.52±1.16	10.63±2.43 ^{ab}	7.35±1.49	13.35±3.38 ^{ab}	19.55±4.32	25.85±4.26 ^{ab}	39.25±9.34	77.48±13.51 ^{ab}
双间室病变单组	35	9.05±2.18	23.51±3.42 ^{ab}	4.64±1.25	9.38±2.35 ^{ab}	7.12±1.23	11.67±3.27 ^{ab}	19.61±4.33	23.75±4.24 ^{ab}	39.75±8.42	66.59±11.47 ^{ab}
三间室病变组	33	8.97±2.15	21.37±3.28 ^a	4.81±1.27	8.22±2.14 ^a	6.98±1.45	10.09±3.12 ^a	19.64±4.35	21.63±4.13	37.42±6.33	60.67±10.34 ^a
F值		0.040	11.419	0.484	9.355	0.623	8.612	0.004	8.644	0.760	17.869
P值		0.960	<0.001	0.618	<0.001	0.538	<0.001	0.996	<0.001	0.470	<0.001

注:与本组术前比较,^a $P<0.05$;与三间室病变组比较,^b $P<0.05$ 。

表3 术后3组患者临床疗效比较 (例)

Tab. 3 Comparison of postoperative clinical efficacy among the three groups (case)

组别	例数	优	良	中	差	优良率(%)
单间室病变组	36	17	9	7	3	72.22
双间室病变单组	35	15	11	6	3	74.29
三间室病变组	33	12	10	7	4	66.67
χ^2 值						0.510
P值						0.774

表4 术前、术后3组患者血清炎症因子水平比较 (pg/mL, $\bar{x}\pm s$)

Tab. 4 Comparison of serum inflammatory factors levels among 3 groups before and after surgery (pg/mL, $\bar{x}\pm s$)

组别	例数	IL-6		IL-7	
		术前	术后	术前	术后
单间室病变组	36	4.67±1.23	2.41±0.63 ^{ab}	5.77±1.32	3.26±0.84 ^{ab}
双间室病变单组	35	4.69±1.25	2.95±0.74 ^{ab}	5.68±1.36	3.72±0.95 ^{ab}
三间室病变组	33	4.72±1.28	3.58±1.12 ^a	5.72±1.34	4.35±1.12 ^a
F值		0.014	14.018	0.040	10.861
P值		0.986	<0.001	0.961	<0.001

注:与本组术前比较,^a $P<0.05$;与三间室病变组比较,^b $P<0.05$ 。

3 讨论

KOA是单间室受累严重,进而引起其他两个间室受累,因此通常需要通过手术置换受损软骨表面,消除炎症,缓解症状,进而改善膝关节功能。TKA、UKA是KOA患者治疗的较好方式,UKA主要用于单间室病变,对于多间室应用效果有限,而TKA创伤性大,术后恢复慢,因此根据膝关节疾病分级和病变部位选择更佳治疗方式是临床一直以来亟待解决的问题^[13-14]。本研究显示,对单间室病变患者采取PFJ或UKA,双间室病变单患者行BKA,三间室病变患者行TKA可获得满意效果,因此,PFJ或UKA的有效应用可为KOA患者提供更佳选择。

本研究随访术后18个月患者膝关节恢复情况,结果显示,术后,3组患者ROM评分、KSS临床评分、KSS功能评分及膝关节功能JOA评分较术前显著升高,且单间室病变组和双间室病变单组ROM评分、KSS临床评分、KSS功能评分及膝关节功能JOA评分

高于三间室病变组,并且3组患者临床效率差异无统计学意义,说明对单间室病变患者采取PFJ或UKA,双间室病变单患者行BKA,三间室病变患者行TKA,可有效促进患者术后膝关节功能恢复,进一步提示对于不同膝关节疾病分级和病变部位患者采取不同手术方式,可获得最佳治疗效果。究其原因,膝关节内侧单间室KOA以TKA、UKA治疗可获得良好远期疗效。UKA手术创伤性小,术后恢复快,可通过置换膝关节内、外侧室受损的软骨表面,并能最大程度保留交叉韧带组织,从而保留患者关节运动感觉;同时手术过程中不会损伤正常的关节间室,是单间室病变患者最佳选择^[15-16]。由此提示,UKA手术对膝关节整体结构破坏较小,对外侧间室影响较小,且可保留前后交叉韧带,进而保证膝关节功能。因此,对单间室病变患者予以UKA手术效果更优。而TKA手术会破坏正常交叉韧带和外侧关节间室,进而导致患者关节感觉损伤,术后恢复较慢^[17-18]。一般情况下单间室KOA患者是不需要破坏正常的外侧关节间室及交叉韧带的,但TKA可造成局部病变扩大化,所以,TKA手术创伤大、会破坏正常关节间室,造成过度治疗,不适合单间室病变患者,而本研究中三间室病变患者采取TKA手术效果更好,患者ROM、膝关节功能及疼痛情况均得到显著改善,因此TKA手术更合适膝关节三间室病变患者。对于髌股关节单间室病变患者行PFJ,以非嵌入式(Onlay)滑车假体进行置换,并遵循旋转角度与股骨通髁线平行或与Whiteside线垂直的原则,充分保证了髌股关节旋转对线,为髌骨获得良好活动轨迹,进而有助于患者膝关节功能恢复,这也是近年来骨关节外科手术研究的热点。双间室病变采用髌股假体联合单髁假体置换,保留了膝关节韧带,在内侧留出间隙避免了外侧间室退变导致关节炎进展,同时术中以骨髓外和间隙定位充分保留骨量,避免了过度填充,因此,双间室置换在保留膝关节韧带、保留骨量方面具有优势^[19-20]。虽然在以往研究中应用较少,而本研究发现其对双间室病变具有较好应用效果,可为KOA双间室病变患者

手术治疗提供更佳选择。

术后3组患者血清炎症因子IL-6、IL-7水平较术前显著降低,且单间室病变组和双间室病变组IL-6、IL-7水平低于三间室病变组,说明UKA对于单间室病变,UKA联合PFJ对于双间室病变在炎症缓解方面效果较TKA更佳,这可能是因为TKA手术对膝关节损伤较大,且破坏正常关节间室,升高炎症因子,增加关节炎进展风险。IL-6、IL-7是介导炎症反应的重要细胞因子,参与软骨破坏,其水平降低反映了炎症对软骨的破坏降低,关节软骨退化延缓,有助于膝关节功能恢复^[21-22]。间接证实不同手术方式的选择对患者膝关节炎症反应影响不同,提示根据患者病情选择合适手术方式的重要性,在KOA患者术后恢复方面具有重要意义。但由于样本量太小,且患者个人资料可能存在一定偏差,还需扩大样本量,明确患者病情及损伤情况,进而为KOA选择更佳手术方式提供指导。

综上所述,UKA与TKA在KOA治疗中可获得较好疗效,根据膝关节疾病分级及病变位置选择合适手术方式可更好的促进KOA患者膝关节功能恢复,获得更佳治疗效果。

利益冲突 无

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